Mid-IR Observations of T Tauri stars: Probing the Star-Disk Connection in the Terrestrial Planet Zone

Praveen Kundurthy
Steward Observatory
University of Arizona
933 N. Cherry Ave.,
Tucson, AZ 85721
USA
praveen@u.arizona.edu

Michael R. Meyer
Steward Observatory,
University of Arizona
USA

Massimo Robberto
Space Telescope Science Institute
USA

Steven V.W. Beckwith
Space Telescope Science Institute
USA

Tom Herbst
Max Planck Institut für Astronomie
Germany

It is believed that planetary systems form from circumstellar disks around stars. Studying the properties of disks around T Tauri stars could give us clues to understand the origin of our own inner solar system. We investigate early circumstellar disk evolution by analyzing mid-Infrared observations of carefully selected young single stars from the Taurus-Auriga molecular cloud. We attempt to distinguish evolutionary effects of star+disk systems and dynamical effects of any possible low mass companions. Combining observations in the mid-Infrared K-band (2.2 microns) and N-band (10.16 microns) of young stars, we can probe a region in the disk from a few stellar radii through the terrestrial planet zone (0.05-2.0 AU). By analyzing the relationship between the (K-N) color index and the rotation period of the star, we investigate the role circumstellar disks might play in regulating the angular momentum of stars in the pre-main sequence stage. Similarly we compare this color index to binary separation to understand if low mass companion stars affect inner disk structure Previous work in the Taurus cloud (Edwards et al. 1993; Bouvier et al. 1993) suggests that slowly rotating T Tauri stars possess optically-thick inner accretion disks, while rapidly rotating stars lack such disks. We extend these results with 10 micron observations of weak-emission T Tauri stars (lacking active disk accretion) in Taurus and compare our results to those of Stassun et al. (2001) for young stars in the Orion Nebula Cluster.